Introductory Activities: Setting the Stage  
  
Living organisms have unbelievable methods of communicating on a microscopic and macroscopic level. Microscopically, cells release key chemicals to signal when a cell should take in nutrients, make proteins (amino acids), create energy and divide. The ability of a cell to communicate when an action is needed depends on the code of life, DNA. The DNA within the cell directs the making of amino acids (proteins) and maintains metabolic functions based on the sequence within the code.   
  
Macroscopically, humans and animals have shared a common link of communication. Often, the communicative link is founded in a look, a touch, or a sound. In most cases, it is not because of a common verbal language that each species shares. The ability of animals and humans to communicate is not coincidental, but directly relates to the microscopic similarity in amino acid sequences in a variety of protein strands.   
  
This lesson is designed to help students see the similarities in amino acid structures of various organisms, but also gain a greater awareness of the nonverbal communication occurring between animals and humans.  
  
Step 1   
  
Ask students: "How do we communicate with each other (meaning between human beings)?" (Students should respond with such answers as talking, singing, and physical gestures.) Ask your students, "How would two human beings communicate if they did not speak the same language?" (Students might respond with simple terms or gestures signifying their message.) Ask the students the significance of words in a language. (Students would reply with such answers as words indicating a direct act, thought or feeling). In the early days of transcontinental communication, messages were sent by an electronic pattern called Morse Code. Let us investigate how words can be translated into a non-verbal means of communication.  
  
Step 2   
  
Provide the students with a **FOCUS FOR MEDIA INTERACTION**, asking them to log on to the Web site at <http://www.omnicron.com/~ford/java/NMorse.html>, type in the words, "Let's have fun" and describe how this means of communication is helpful. The Web site allows students to type in words and then the site plays their message in Morse code. Ask the students why Morse code is helpful in communicating. (Students may state that Morse code is a way to communicate if words cannot be spoken.) Would this be an effective way of communicating today, why or why not? (Students may state that current means of communication are much quicker and more reliable than having to know the Morse Code; people can speak directly via cell phones, email etc.) Allow the students the opportunity to enter their own message to hear what it sounds like in Morse code. Is communication necessary? Why? (Students might say that people need to communicate to conduct business, learn or secure things like food, water or shelter.) What if we could not communicate by voice? By what means would we communicate? (Students would say that we could move our hands to gesture what we need, write notes, etc.)   
  
  
Step 3   
  
Ask students: How do our bodies communicate to us externally as to how we feel internally? (Students may offer that the heartbeat is an indication of excitement, sweaty palms or shallow breathing may signify nervousness, or fatigue or an illness may signal an internal infection.) Besides the outward physical signs of our bodies communicating to us, our bodies are communicating on a much smaller microscopic level. This type of communication commonly occurs between two cells or maybe even within one cell.   
  
Step 4   
  
Explain to students that different cells and/or components inside of a cell communicate constantly. The means by which a cell can pass information to other cells is through structures called proteins. Proteins, or more specifically, amino acids, instruct the cells when to make energy, to grow and when to divide, just to list a few examples.   
  
Step 5   
  
So let's us find out how difficult it is for a protein to communicate a simple message. (Teachers: This activity is optional depending on your comfort level with students and their means of communicating.) Have the students arrange themselves in rows, either standing or in chairs. Instruct the students that this activity is similar to "Telephone," where a message will be communicated to the first person and they will send the message to the next. The goal will be to try to communicate the same message from one person to the next. Here is the trick: the students cannot use words to communicate the message through their voice, only through physical gestures. Start each row with a simple word, yet a different word. Some suggestions might include: banana, apple, orange, pencil, etc. This will give the students a chance to communicate the word without becoming frustrated. Allow them ample time to communicate the message; this is not a speed game, yet.   
  
For the second round, give each row a small phrase to communicate. The teacher may even tell the students it is a small phrase. Some examples of phrase might include: "Leave me alone," "I am happy," "Give me some money," "I need some help," or "Hey, it's a great day." Again, give each row a different phrase to communicate. This time, instruct the students that they are all simulating proteins sending a message to another cell; so communicating the message quickly is critical. The first team to correctly send the message is the winner. (Teachers may find that some or none of the students correctly communicate the message. This will provide a convenient segue into how difficult it is for proteins to accurately communicate a message within a cell and to other cells.)   
  
  
Step 6   
  
Just like the game "Telephone" or in Morse Code, both events created a link between two places. Amino acid strands are the communication links inside an animal's body. Each protein or amino acid strand communicates a specific message. That same message in one animal (chimpanzee) can be equally communicated in a different animal (gorilla) Ask the students to list animals who may share similarities based on their primary function (i.e. land dweller, uses oxygen, has opposable thumbs, eats meat or vegetables etc.)? (Students will offer many animals and how they relate in function; some answers might include humans and chimpanzees are similar because of their opposable thumbs; giraffes and gazelles eat vegetation and have four legs; etc). The similarity in animal's functional part or behavior is not coincidental; it is due solely to the presence of similar amino acid strands inside the animals' cells.